

**CCAG**

Climate Crisis  
Advisory Group

Climate Change

& Food Systems







# The link between food systems and climate change

**Without a substantial transformation, emissions from food systems could make up to 70% of total greenhouse gas emissions by 2050.<sup>1</sup>**

Food systems are a vital part of human activity. However, existing food systems release large amounts of greenhouse gases (GHG) into the atmosphere, making a direct contribution to the climate crisis. Activities related to modern-day food production – transportation, processing and packaging; storage and consumption; manufacturing of fertilisers, pesticides and animal feed; alongside food losses and food waste – currently account for more than 30% of global GHG emissions.<sup>2</sup>

While food systems are a growing contributor to climate change, at the same time, climate change is having devastating effects on food systems. Understanding the links and interactions between food systems and climate change is key to a strategic response to the global crises of inequality, food insecurity, hunger, and climate change.<sup>3</sup> These global threats are intertwined, and efforts to combat climate change will safeguard our food systems as well as provide an essential climate response.

Small changes in global temperature

correspond to large changes in the earth's climate. The crops and farming methods that humans rely on today have co-evolved with a relatively stable global climate over thousands of years. Humans have relied on predictable seasons and dependable crops to produce food. As a result, even relatively small changes in the climate put chronic stress on these production processes, with rain, temperature and seasonal patterns shifting and disturbing production.<sup>4</sup>

On top of this, extreme weather events – drought, floods and storms – can destroy crops, animals and livelihoods in a matter of hours. Farmers around the world are experiencing this already, and current farming systems risk being unsustainable within the lifetime of children already born.<sup>5</sup> All of this puts the aims of Sustainable Development Goal 2, the United Nations' 2015 initiative to achieve zero hunger by 2030, under the spotlight; gains in nutrition and food security made in recent years are at risk of being rapidly lost.



## IMPACT ON FOOD STAPLES

**The complex nature of climate systems means that slight changes in average temperatures lead to significant disruptions to weather patterns, impacting the world's supply of the most common staple foods such as rice, maize or wheat.**

In 2021/2022, approximately 2.7 billion metric tonnes of grain were produced globally; maize constituted over 1.2 billion metric tonnes, wheat about 778 million metric tonnes, and rice some 509 million metric tonnes.<sup>6</sup>

However, the link between food production and climate can be turned to our advantage. A more stable climate would support more resilient food systems and contribute to the global goal of reducing food insecurity. Food production can be harnessed and adapted to help create

new carbon sinks, reduce emissions and support climate stability.

Furthermore, a more stable climate will offset some of the food damage and loss inequities. Vulnerable communities, especially in Asia and Africa, are already dealing with hunger and are consistently the most exposed to extreme climate events. This makes their food supplies the most vulnerable.<sup>7</sup> Yet, these communities - particularly those in Africa - have contributed the least to global GHG emissions.<sup>8</sup>



RICE PADDIES, UBUD, INDONESIA. IMAGE: JOEL VODELL



## THE EMISSIONS PATHWAY

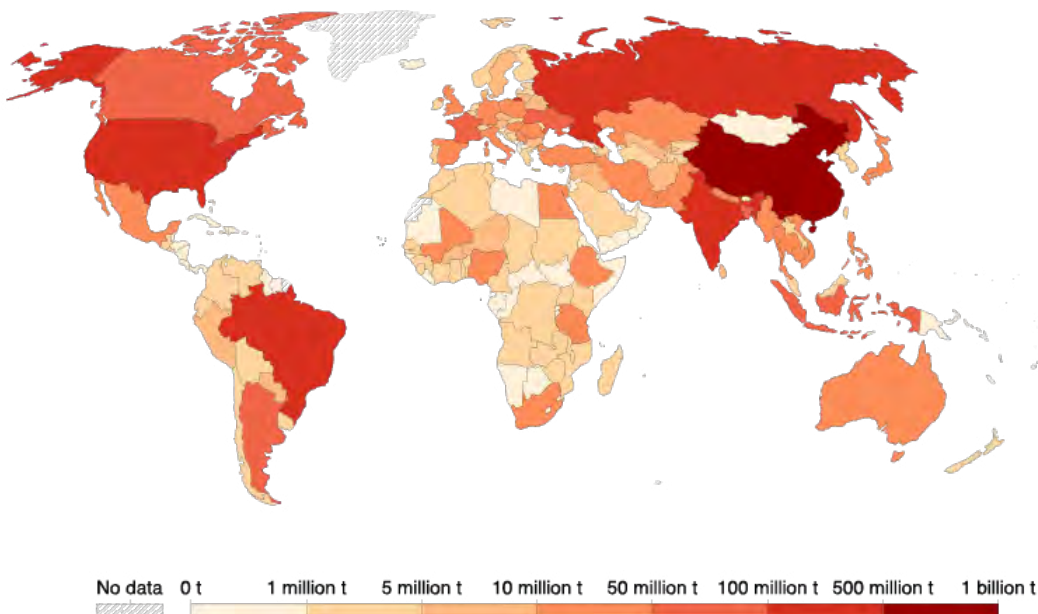
- Human activity has warmed the earth and its oceans, raising global temperatures an average of 0.08°C each decade since 1880.<sup>9</sup>
- The current global average temperature increase of over 1°C has changed the earth's climate and triggered a relentless series of climate-related disasters.
- The 2021 Glasgow Climate Pact ratcheted up the sense of urgency, setting 1.5°C (down from 2.0°C) as the only objective that gives humanity a reasonable chance of a manageable future.
- Current global efforts are consistent with a medium to high emissions pathway. Without very substantial reductions in global emissions, the warming for an individual month or year may exceed 4°C by the early 2060s.<sup>10</sup>
- At current projected levels of heating, farming as its known today could be lost forever, affecting the distribution of arable land and the productivity of major crops.

## THE IMPACT OF HIGH TEMPERATURES ON FOOD PRODUCTION

- Sustained temperatures above 30°C affect wheat and maize, severely reducing yield, without reducing the labour involved in harvesting or the effort required to bring the crop to maturity.
- Given that maize is also commonly used as fodder for livestock, the same temperature patterns harm livestock production.
- Rice is even more sensitive to high temperatures, with a reduction in yield of 10% per 10C increase in mean temperature beyond 25°C, and a total loss of crop at temperatures around 35°C to 36°C.<sup>11</sup>

**FIGURE 1**

### CEREAL PRODUCTION, 2020



China is the largest producer of cereal in the world with rice, maize, and wheat accounting for more than 90% of its total food production.<sup>12</sup> China is also one of the countries with the largest GHG emissions arising from food systems.<sup>13</sup> An increase in local temperatures beyond a certain threshold results in significant loss of crop yield, whereas there can be considerable resilience within those thresholds.

**Figure 1 source:**  
Our World in Data,  
UN Food and Agriculture  
Organization (FAO)





COMBINE HARVESTER HARVESTING WHEAT, NORTH DAKOTA, USA. IMAGE: DARLA HUESKE

# How do food systems contribute to the climate crisis?

**Food systems are complex, involving producers, traders, businesses, processors, and consumers within interconnected processes.**

Although these processes produce enough food to feed everyone in the world, our current food systems are inadequate, leaving millions of people hungry or food insecure, with mountains of food going to waste elsewhere.<sup>14</sup> The fragility of food production is highlighted by the fact that farmers are often those who struggle most, with many unable to afford a decent living.

Global food systems are built on practices that frequently have hidden costs associated with inequity, including unfair wages, diet-related chronic diseases, and GHG emissions. Food production is largely driven by consumer demand, making any focus on sustainability a challenge. As a result, current food systems have high negative impacts on biodiversity and the wider environment, linked to deforestation, species extinction and land degradation.<sup>15</sup> All of these trends arising from food production increasingly compromise the world's ability to meet future food production demands.

**There are three clear levers for system transformation, each only effective if all three are operated together:<sup>16</sup>**

- Dietary change: A predominantly plant-based diet, locally grown and with minimal waste is the ideal towards which a shift is needed.

- Land set aside for biodiversity: Keeping specified areas of land for biodiversity, to the exclusion of other uses including farming, and protecting or restoring natural habitat offers the most benefit to biodiversity and carbon sequestration across a given landscape.
- Adapting the way land is farmed: There is good understanding of many farming methods that can help. These include: 'precision agriculture', minimising the use of inputs; foregoing some chemical and synthetic inputs in favour of ecological pest controls, pollination and soil fertility; explicitly 'nature-friendly' farming. Each of these will increase biodiversity, reduce emissions and enhance carbon sequestration.

Although the cumulative impact of food systems has become a global problem, at the grass-roots level food production is a mosaic of many different systems, each imposing a range of different environmental impacts. High-input industrial agriculture is most problematic, and must not be put in the same basket as traditional agroecosystems, agroforestry, and organic farming, for example. The small-scale and local systems of farming often offer insight into how food production might be better delivered across the world.



**FOOD SYSTEM EXEMPLAR: SIKKIM, ONE OF THE SMALLEST STATES IN INDIA, IS THE FIRST IN THE WORLD TO PHASE OUT CHEMICAL FERTILISERS AND PESTICIDES, BECOMING 100% ORGANIC. ALL OF THE STATE'S FARMLAND IS CERTIFIED ORGANIC. THERE ARE CHALLENGES IN MAINTAINING YIELDS UNDER THIS MANDATED ORGANIC SYSTEM, AND CONSULTATION AND ENGAGEMENT WITH LOCAL FARMERS IS AN IMPORTANT PART OF ANY SUCH TRANSITION.**







AFTER THE HURRICANE, CRUZ BAY, ST JOHN, US VIRGIN ISLANDS. IMAGE: CD WHEATLEY

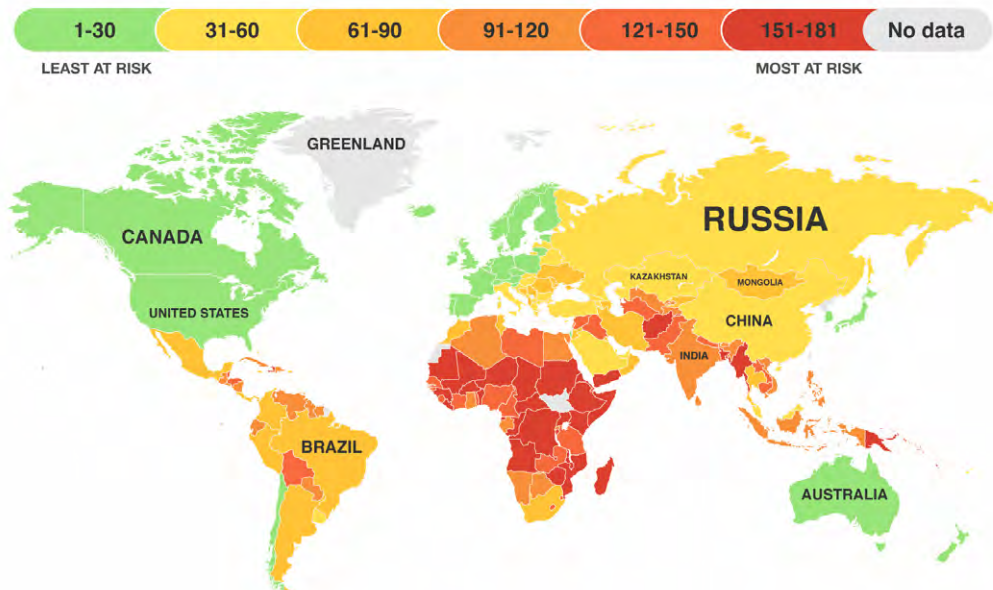


# Compound effects

The cascading effects of the COVID-19 pandemic and the war in Ukraine further stretched global food systems, but they were already weakening under the stresses of climate change.

FIGURE 2

## COUNTRIES MOST VULNERABLE TO CLIMATE CHANGE<sup>17</sup>



Between 2019 and 2020, about one in 10 people went to bed without enough food, and communities across Africa were the worst hit. Out of 811 million people facing food insufficiency globally, 282 million were from African countries.<sup>18</sup> Even before the COVID-19 pandemic, the African continent was already suffering a series of climate-related disasters, such as sustained drought and calamitous swarms of locusts in East Africa.<sup>19</sup>

People in affected areas must deal with loss of life, damage to their homes, and harm to their livelihoods. In almost every case, the ability to produce food is interrupted in these affected areas, causing immediate local hardship, and spreading market challenges everywhere that push up food prices for all.

The greater frequency of extreme weather events is disastrous, particularly to communities that are already vulnerable with low adaptive

capacities. Low-income regions of Sub-Saharan Africa and South Asia are particularly at risk, yet they are also already dealing with acute food security problems.

As the magnitude and frequency of extreme weather events increases, the stability of the global food supply will continue to decline.<sup>20</sup> If the world does not act with urgency, it is expected that by 2050, the number of people at risk of hunger as a result of climate change will increase by 10 to 20 percent.<sup>21</sup>

Floods affect food production in Ghana; fires in Australia have caused four to five billion dollars' worth of loss to food systems; hurricanes have caused disastrous losses to food systems and exports in the Caribbean nations.<sup>22</sup> Most recently, disastrous flooding in Pakistan has left over 1,000 people dead and millions without proper shelter. Caribbean Islands continue to face sea-level rise, rising temperatures, and more extreme weather events.



## FARMING SMALL - AND AT SCALE

**While agricultural production in developed countries is dominated by large industrial and export-oriented farms, in developing countries the sector is driven by small family farms.**

About 35% of the food eaten by humanity is produced by smallholder farmers operating on over 500 million small parcels of land, adding up to about 12% of global agricultural land, and the workplace to 95% of the world's farmers.<sup>23</sup> More than 50% of smallholder farmers and pastoralists are in Latin America, sub-Saharan Africa and Asia, and are responsible for 50% to 80% of food supply in these regions.<sup>24</sup> Yet most of these farmers engage in rainfed agriculture which is most sensitive to changes in climate.

Both large- and small-scale agriculture must consider strategies that are economically and environmentally viable in the face of climate change. Climate change may lead to changes in crop production patterns and expansion of irrigated acreage, which in turn tend to stress environmental and natural resources. Yet large scale industrial farming is already associated with environmental damage through soil and water contamination, over-production of waste and deforestation. Addressing these issues will require large

farms to invest in innovative waste management approaches and sustainable crop production systems that protect the environment.

Given the right support and recognition, smallholders can adopt practices that would lock in a better future for their soil, reduce emissions and increase production. Regenerative farming strategies offer promising opportunities, however, these practices are not intuitive. Information, training and access to finance, crop insurance, seeds and inputs are essential for sustainable farming.<sup>25</sup>

If food production is to remain sustainable, the world has to strengthen the global response to reach the goal of limiting global warming to 1.5°. This implies reaching net zero by 2050, and will absolutely have to include deep reductions of food systems related emissions. Africa will continue to be the continent most vulnerable to climate change - but extreme weather events have already affected food production in areas supposedly least at risk, such as Australia and the USA.

***“Droughts have become worse and longer than ever before”***

*“In 2022, we have not yet seen the August rains; we last had rain in April. And this is similar to the last three years. In my family we have lost more than 30 cows in the span of a year. This is terrible for our cattle; we have now resorted to raising goats and camels instead.”*

Musa Leupea, Masai from Samburu, East, Kenya, September 2022



An aerial photograph of a banana plantation. The left side shows a dense field of mature banana plants with large, green leaves. The right side shows a nursery bed with rows of young banana plants, each in its own small plastic mulch container, arranged in neat, parallel lines.

## FINANCE SHORTFALLS

- It has been estimated that the global community of smallholder farmers needs about 240 billion USD of investment per year to thrive and cope with the impacts of climate change, and to reduce the impacts of agriculture on the climate.<sup>26</sup>
- In reality, only 3% of climate finance goes to support agriculture, while approximately \$10 billion a year benefits farmers at all, whether for large or small holdings.<sup>27</sup>



# Building sustainable food systems

**Potential routes to construct more sustainable food systems are highly diverse, tackling the means of production, processing, and even dietary habits.**

## **Interventions might include:**

- Integrated farming measures focusing on regenerative agriculture, promoting ecological processes and limiting the use of mechanised tillage and synthetic inputs
- Reduced reliance on inorganic nitrogen fertilisers, reducing N<sub>2</sub>O emissions
- Focusing on locally produced foods and reduction of food miles, saving fossil fuel emissions from associated transport and cold chain storage, while also lessening the potential for food loss
- Offering diet options that are healthy as well as having a low environmental footprint – for example, reducing rice production while increasing take up of millets.<sup>28</sup> Reducing highly processed food items involves reducing energy use whilst also improving diet quality. Likewise, carefully managing

consumption of livestock reduces methane emissions and has the potential to improve health outcomes

- Reducing household food loss, and supporting farmers to reduce post-harvest losses, to get more food onto plates. Food waste damages the environment twice – emissions embodied in the food production are wholly wasted, and food that is thrown away produces methane emissions as it decomposes.

Food systems that deliver sufficient and healthy diets with limited impact to the environment will require a range of interventions that are implemented consistently. Major food producers and large companies within the global food system have a significant role to play in making these changes. Policy will rely on incentives such as support for collaborative approaches with all actors, and also constraints such as regulation and standards for food system participants.



## CUTTING OUR LOSSES

**Tackling food waste would reduce GHG emissions and simultaneously improve food security.**

- Globally, approximately 30% of the food produced does not end up on plates – lost through food production and supply chains, or wasted at the consumption stage.<sup>29</sup>
- In developed countries, most food waste happens in households, whereas in developing countries, most food loss occurs after harvest and before it reaches the kitchen.
- The food produced but not eaten would be sufficient to feed two billion people – more than twice the number of hungry people in the world.<sup>30</sup>
- The resources that go into producing this food are also wasted. When food rots, it emits methane, generating up to 8% of GHG emissions.<sup>31</sup>
- Systems that recycle surplus food, food lost or wasted, can help tackle the global food waste challenge by making food value chains more resource efficient at every level.



## RESTORING DEGRADED ECOSYSTEMS

**Depleted land makes farming difficult. Soil is washed away by rain, and fails to store moisture for dryer seasons. But there are success stories where poor landscapes have been brought back to life through the adoption of systematic intervention.**

Rwanda is one of the African countries most prone to soil erosion. By working with local experts, the country developed a land and water management approach that has reduced soil erosion and restored land fertility. This comprehensive land management model, supported by the World Bank, rehabilitated over 40,000 hectares of land and bought back 20% of depleted land into food production. After a rehabilitation process of less than 2 years (3 cropping seasons) farmers could double their crop yield and income.

On a different scale, China's Loess plateau (154,000 square miles) was once an abundant forest and grassland system. Over time, the soil was depleted by over-farming and the landscape was eroded by wind and water. The entire area lost its fertility and its ability to absorb and retain moisture, drying out to become a desert. Today, terracing, sediment traps, check dams and other methods of infiltrating rainfall have restored many thousands of square kilometres of the Loess Plateau.

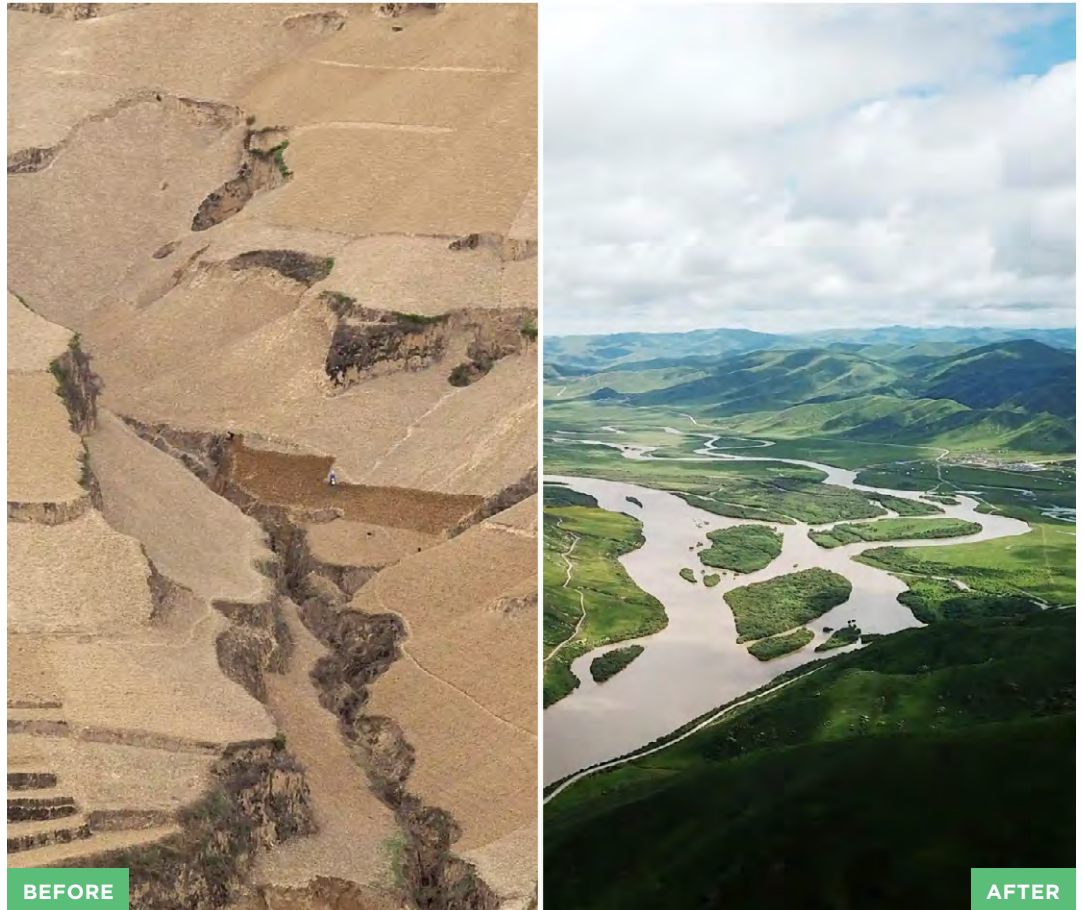
### TERRACED FARMLAND IN RWANDA



TERRACED HILLY LANDSCAPE NEAR BUSENGO, RWANDA, AFRICA. IMAGE: FABIAN VON POSER



## CHINA'S LOESS PLATEAU BEFORE AND AFTER INTERVENTION TO RESTORE ITS FERTILITY



### INSURING AGAINST CROP FAILURE

**Today, many farmers are dealing with more losses than gains, due to too much or too little rain, or rain at the wrong time.**

As a result, smallholder farmers, particularly those in developing countries, need safety nets to help them take the risk of trying new farming methods with the potential to increase yield, and to prevent them from leaving their farms and food production altogether.

Regional and local institutions like

Pula, an insurance tech venture based in Nairobi, can play a significant role in helping farmers recover from climate related shocks. Pula has signed up more than 4.7 million farmers in 17 countries in Africa and Asia. At least 154,000 farmers have made claims on the schemes to protect their income from crop failures, enabling them to continue to farm.



# The role of cities

**With over half of the world's population living in urban areas - projected to increase to 66% by 2050<sup>32</sup> - cities have a particular power to reduce food systems related emissions.**

Primary production of food is usually in rural areas, often distant from cities. Processing, packaging, and transportation all add to the typically high footprint of urban food supplies. However, when cities unite in their efforts to understand urban food systems and address associated environmental issues, there are opportunities for big reductions in emissions.<sup>33</sup>

**We take a look at key issues below:**

## 1. TACKLING FOOD WASTE

In the USA, the average person wastes over 20% of the food they buy.<sup>34</sup> The majority of this wasted food is fruit and vegetables, but dairy, meat and fish are also thrown away, with 31% of all seafood being wasted. Likewise, food waste has been found to make up 50% to 70% of municipal solid waste in some Chinese cities.<sup>35</sup> Over-buying, poor planning, preparing too much, and allowing food to spoil before it is cooked are all causes of food loss. Food labelling dates also increase waste, since consumers are governed by the 'use by' or 'sell by' dates, rather than considering the condition of the food. An additional factor in food waste is a lack of understanding of the links and realities of the environmental costs of food production.

To mitigate against food waste, cities can raise awareness of the cost and lost opportunities of throwing away food. They can also reduce emissions by efficiently collecting, recycling and composting organic waste.

## THE OKAERI YASAI PROJECT

In Japan, which throws away some 19 million tonnes of food annually, the Okaeri Yasai initiative collects food leftovers from supermarkets and schools in the city to make compost for vegetable gardens. This method of composting does not produce much methane compared to landfills, as the methane-producing microbes are not active when exposed to oxygen. On the other hand, food waste sent to landfill, is mixed with many other types of garbage and is not exposed to oxygen leading to the production of more quantities of methane.<sup>36</sup>





FRUIT ROTTING. IMAGE: MAREK STUDINSKI

## 2. SHIFTING TO MORE SUSTAINABLE CONSUMPTION HABITS

Globally, half a billion people are obese – about 7% of the global population, mainly living in vulnerable city neighbourhoods – yet close to 10% of the world’s population also suffers from chronic undernourishment.<sup>37</sup> Not only are the current food systems unequal and unfair, they damage human health and the planet. These distortions within the current food system could be addressed as part of adjustments to global food systems, for the benefit of consumer health as well as the global environment.<sup>38</sup>

While there is some evidence of growing consumer preference in wealthier communities for organic and locally produced food,<sup>39</sup> consumption of highly processed food and sugar-

sweetened beverages continues to increase. Economic prosperity raises the demand for food that often causes diet and lifestyle-related health problems, such as cardiovascular disease and diabetes.<sup>40</sup> At the same time, and in the same cities, there are many families who cannot afford a healthy meal because healthy food is often more costly than less healthy alternatives.<sup>41</sup> Affordability and accessibility are all important drivers of dietary demands and household behaviour. Diverse and healthy food must be made widely available and affordable. Without such changes, behavioural change alone cannot do much; there has to be a collective effort encompassing both public policies and societal change.

### NOVEL SOLUTIONS

- ‘Pay as you feel’ restaurants have sprung up in many cities around the world, built on trust and a belief that food is the best way to bring people together. This concept can address the issue of hunger in cities, while also reducing the quantity of food that goes to landfills.
- In another move to reduce waste, ‘Fruta Feia’ – meaning ‘ugly fruit’ – seeks to tackle the 30% of food production in Portugal that is discarded or left in the fields to rot. Fruta Feia enables city dwellers to embrace fresh ‘imperfect’ goods. Every week, the cooperative visits local producers and farms to purchase otherwise rejected ‘too small’, ‘too big’, or misshapen fruit and vegetables.<sup>42</sup>



### 3. TREATING FOOD AS A PROCESS NOT A PRODUCT

Most food is processed, packaged and transported, often several times, before being marketed and sold. Every stage contributes to climate change by creating GHG emissions. Understanding where our food comes from can be essential for climate mitigation. Buying locally produced food will reduce fossil fuel emissions associated with transport and cold chain storage, for example.

The description of a healthy and nutritious diet varies widely across nations, traditions, and cultures. Using a food systems lens to look at production, consumption, health and the environment provides an opportunity to analyse these processes, while simultaneously identifying solutions that address these interrelated global issues, often starting at a local – or even household – level.

#### MAGICAL BEANS

A primary source of protein in many parts of the world, including all Latin American countries, beans have excellent nutritional value. They also have a surprisingly low carbon footprint because they often require no, or limited amounts of, added fertiliser. In addition, beans draw nitrogen from the atmosphere and fix it in the soil, helping to repair the environment, while enhancing soil health for subsequent crops and reducing the need for chemical fertilisers.

However, cooking time for the staple African common bean, for example, is between one to three hours, demanding large amounts of water and fuel. This hefty cooking time undermines some of the climate-friendly and household-economy advantages of the bean as a food source.

Researchers are working hard to reduce bean cooking time by 30%, so that the merits of a bean-based diet reach all the way to energy-use in the kitchen and economy in the household.

A multitude of bean varieties have found their way to the table in every area and culture of the world, highlighting the importance of guaranteeing the genetic diversity of crops, together with the requirement for international collaboration to build germplasm infrastructure in less developed countries. Genetic diversity secures resilient food systems as growing and climate conditions continue to change.

Seeing the potential of bean production and consumption, the 2022 Africa Green Revolution Forum (AGRF) promoted the bean as a ‘super crop’ that can address issues of nutrition, climate change, sustainability, and soil fertility.





## 4. MITIGATING GHG EMISSIONS FROM LIVESTOCK

As cities promote a rise in the world's middle class, there is ever increasing demand for meat and dairy products.<sup>43</sup>

The livestock sector poses particular environmental challenges, consuming resources and creating about 14.5% of total global GHG emissions.<sup>44</sup>

Emissions are created at every stage of meat production, with high emissions production dominating in the USA, Europe and Australia. In the first instance, animals often feed on crops that have already been cultivated, already embodying the emissions linked their land-use, fertilisers and machine-based harvesting. By contrast, where animals graze on permanent grasslands, their emissions footprint is reduced. Pasture grazing is widespread in parts of Latin America and, in lower concentrations, pastoralism is found in different parts of the world, particularly Africa. However, grazing land that results from forest clearance obviously embodies the emissions of lost forests - a very high emissions category. The detail in individual meat production systems is crucial to determining the GHG emissions impact.

As high-fibre foodstuffs are consumed by animals, particularly cows, their digestion process produces large quantities of methane, which is released mainly through the mouth and nostrils. Animal manure also produces high levels of methane and nitrous oxide. These emissions are inevitable, regardless of the food system the animals are in.

Manure pits are particularly noxious emitters. On big farms they can hold the waste of thousands of animals. Regular removal of manure from pits to outside storage facilities, to allow aerobic decomposition, can reduce methane and nitrous oxide emissions from livestock by 55% and 41% respectively.<sup>45</sup>

Simple biodigesters can use animal manure to provide a local fuel source in the form of biogas, creating positive uses for the waste. Several regions have made significant use of biogas for electricity generation. The EU is leading in biogas electricity production, with more than 10 GW installed and 17,400 biogas plants, while countries like Brazil and Mexico are also making significant progress in biogas production.<sup>46</sup>

Small changes to an animal's diet via methane-reducing feed additives and supplements which inhibit methane producing processes in the rumen, can also significantly reduce emissions.<sup>47</sup> Again we see how the fine detail of how a food and waste management system can make a significant difference to its GHG emissions.

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### COMMUNITY AND COUNTRY-LEVEL INITIATIVES

Juliet Chinenye Ezera, a specialist in pig farming in Nigeria, strongly advocates for proper waste management to reduce methane emissions. She promotes air drying the waste and letting farmers access it as fertiliser after decomposing.

Buczek Biogas Power Plant in Poland generates about 1.8 megawatts of environmentally-friendly energy from animal and plant residues, with potential to generate 12,500 MWhrs per year.<sup>48</sup>

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## 5. PRESERVING FORESTS

As an increasingly urbanised global population has increased food demand and unsustainable consumption, agricultural land has in turn expanded into forest, savannah, natural grassland, and wetland areas.<sup>49</sup> These changes of land-use all tend to have negative consequences for emissions, soil use and sustainability of biodiversity.

Industrial-scale agriculture, and large-scale land acquisition in response to market demands, can lead to conflict with indigenous peoples and local communities, and bring rapid landscape change involving deforestation. A large part of the Amazonian forest area, for example, has been cut down primarily for soya bean production and cattle ranching.<sup>50</sup>

The rate of global deforestation is estimated at 10 million hectares per year, with industrial-scale agriculture as the main driver. Additionally, millions of smallholder farmers, locked into low yields and unsustainable livestock practices, continue to encroach on forests to gain access to fertile land. Cumulatively, this deforestation destroys humanity's best ally in capturing large amounts of GHGs, instead degrading land and reducing biodiversity, while releasing stored carbon into the atmosphere through burning or wood left to rot.

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## WHY MANGROVES MATTER

By slowing the movement of water and trapping sediment, mangrove forests help to stabilise coastlines and reduce the impacts of storm waves and flooding – which, as the climate crisis advances, act as growing threats to farmers on land nearby to coasts. These distinctive trees also help reduce global warming as their rich, waterlogged soil can absorb and store a great deal of carbon.<sup>53</sup>

But mangrove forests are disappearing. Since mangrove forests store thousands of years of carbon dioxide beneath the soil, the destruction of these forests can rapidly release huge amounts of GHGs into the atmosphere. While mangroves make up only 0.6% of global tropical forests, their deforestation is responsible for as much as 12% of GHG emissions.<sup>54</sup>





# Food systems and society

**Food system analysis and commitment can operate at any level of society.**

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Local and community action, and action at national level, are all complementary with each having their role to play. At the national level, commitments can have the biggest impacts, and governments can apply regulatory, advisory, informative, and educational levers to accelerate the process. At the local level, attention can be paid to local needs, environmental conditions and specifically tailored activities to secure lower emissions while enhancing sustainable livelihoods.

## GOOD FOOD FOR ALL

**Convened in New York, the UN Food Systems Summit generated 230 commitments to promote a global shift towards healthier, more sustainable and equitable food systems.<sup>55</sup>**

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Consultation took place with thousands of representatives, including heads of state, youth, farmers and indigenous peoples.

**Commitments were recorded in a registry, each within one of four themes:<sup>56</sup>**

- Nourish All People
- Boost Nature-Based Solutions of Production
- Build Resilience to Vulnerabilities, Shocks and Stresses
- Advance Equitable Livelihoods, Decent Work and Empowered Communities

The four themes illustrate vividly the overlaps between social equity, the need to eat well, the need to withstand the shocks of climate change, and the possibility of enhancing the environment while pursuing these thematic objectives.

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## THE TRIPLE BOTTOM LINE

**Young people, speaking for their own futures at the Food Summit, highlighted social, environmental, and economic sustainability in a food systems approach. Youth representatives promised:**

1. That everyone everywhere has access to healthy, sustainable and resilient food. Youth can make choices every day to eat more sustainable and nutritious diets and strongly advocate for it within their communities and through social media.
2. That youth are ready to support, advocate and take action to tackle climate change and biodiversity loss as needed to drive the urgent transformation towards a liveable future.
3. That livelihoods matter. People working in food systems, many of whom are young people, are amongst the hardest working and in many parts of the world, are sadly the ones paid less than minimum or living wages. Youth will continue to advocate for fair and decent wages for people working in food systems.

### “I’VE BEEN ABLE TO REACH OVER 5,460 WOMEN”

Ewi Stephanie Lamma, who has a Master’s degree in Natural Resource and Environmental Management from the University of Buea, introduced bee-keeping training and fruit-tree planting, among other initiatives, to help farmers diversify their income.

“I started climate-leadership capacity building programmes for women and young people in rural forest-communities of Cameroon, and have been able to reach 5,460 women and over 500 young people in 162 communities and over 20 local forests in my country,” she says.

“My work within Nguti and Takamanda villages has stirred the construction of several nurseries with 110,000 trees – all local species – for revamping degraded sites and farmlands. With my support, rural women have started businesses around bush-mango, beekeeping, mushroom-farming and snail cultivation.”



BEEKEEPER AT WORK, UNITED STATES. IMAGE: HIVEBOXX



## TRANSFORMING INDIA'S FOOD SYSTEMS

**India has made commitments to act at the national level, bringing its population of more than 1.3 billion people into the conversation.**

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The Government of India organised a National Level Dialogue on Agri-Food Systems in January 2021, to source and deliberate on “the commitments India should be making to align food system to achieve SDGs towards 2030”.<sup>57</sup> The dialogue culminated in the document ‘Indian Agriculture towards 2030’, released in March 2022.<sup>58</sup>

This aligns in approach and spirit with India’s participation in the High Ambition Coalition for Nature and People, which seeks to protect 30% of the Earth by 2030.<sup>59</sup> Transforming the food system of India is also essential for the various commitments that India is taking to the global stage, including commitment to achieve Net Zero by 2070, and the Lifestyle for Environment (LiFE) movement announced during COP26.<sup>60</sup>

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WHEAT HARVEST, UTTARAKHAND, INDIA. IMAGE: WANDERING INDIAN





A TOP VIEW OF AN AGRICULTURAL LAND AT THIRUMALAI KOVIL, THENKASI, TAMIL NADU, INDIA. IMAGE: MOHANRAJA C



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